REMARKS

Claims 1-10 are pending in this application. In the office action of March 16, 2004, the Examiner rejected the claims under 35 U.S.C. § 103(a) in view of Hengstebeck U.S. Patent 4,097,544. Applicant requests reconsideration.

Hengstebeck '544 discloses steam cracking apparatus in which steam is injected into the cracked hydrocarbon product stream in a transfer-line exchanger, but in a different way than what is claimed in the present application. In Hengstebeck '544, steam passes down through a central passageway (see 19 in Fig. 3) into a chamber between the bottom tube sheet 16 and the conical shield 18. From there, the steam moves out around the periphery of the conical shield 18 and then down to combine with the product hydrocarbon stream, which then passes upward through the tubes 17. (See Fig. 3 and column 7, lines 17-32.) In an alternative embodiment of Hengstebeck '544, steam enters through a horizontal pipe 25 into the chamber between the bottom tube sheet 16 and the conical shield 18. (See Fig. 9.) From that chamber, the steam passes through small openings in the conical shield 18 around the tubes 17 at the point where they meet the conical shield. (See Figs. 6 and 9, and column 7, lines 33-62.) The steam mixes with the hydrocarbon stream and then passes upward through the tubes 17.

Claim 1 of the present application states that the injection probe and distribution nozzle protrude into the TLE (transfer-line exchanger) cone by a distance in the range of about 1% to about 10% of the radius of the TLE cone. Hengstebeck '544 does not teach or suggest this feature. In Hengstebeck, there are no injection probes and distribution nozzles that protrude into the TLE, much less by about 1-10% of the radius of the TLE cone.

The Examiner has argued that it would be obvious to modify the arrangement of Hengstebeck '544 to include an injection probe and distribution nozzle that protrude into the

TLE cone by a distance in the range of about 1% to about 10% of the radius of the TLE cone, because this would allow for greater steam distribution. However, there is nothing in Hengstebeck '544 that suggests this. Furthermore, the Examiner has offered no reasoning as to why a person skilled in the art would believe that such a modification of Hengstebeck '544 would allow greater steam distribution. Hengstebeck teaches two ways of injecting steam, both of which introduce the steam into the hydrocarbon stream at the planar surface which separates the heat exchanger tubes from the TLE cone. (Hengstebeck '544 refers to the TLE cone as the conical entrance end portion 13, and to the planar surface as the conical shield 18.) Neither is similar to the injection apparatus recited in claim 1. Accordingly, claim 1 is nonobvious. Claims 2-10 depend on claim 1, and therefore they are nonobvious for the same reason.

Applicant has amended claim 1 to correct a minor typographical error. This amendment is not made for any reason relating to patentability, and does not change the scope of the claim. Applicant has also amended page one of the application to correct a minor typographical error. No new matter is added by these amendments.

Please contact the undersigned attorney at (713) 934-4094 if there are any questions relating to this patent application.

Respectfully submitted,

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